

## A New Instrument for Tall Tower Continuous Measurements of CO and CO<sub>2</sub>

J.D. Kofler<sup>1</sup>, A.E. Andrews<sup>2</sup>, A. Legoretta<sup>1</sup>, D.M. Sherman<sup>1</sup>, M. Anfang<sup>3</sup>, J.C. Williams<sup>3</sup>, and P.P. Tans<sup>1</sup>

<sup>1</sup>Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder. 80309; 303-497-4679, Fax: 303-497-5590; Email: [jonathan.kofler@noaa.gov](mailto:jonathan.kofler@noaa.gov)

<sup>2</sup>NOAA Earth System Research Laboratory, GMD, 325 Broadway, Boulder, CO 80305;

<sup>3</sup>Science and Technology Corporation, Boulder, CO 80305

To better understand land based sources and sinks of carbon, NOAA's Global Monitoring Division (GMD) is expanding the tall tower network to from three sites to twelve as part of the North American Carbon Program (NACP). For this expansion a well-designed instrument is the key to maintaining uninterrupted high accuracy measurements of CO (<10 ppb) and CO<sub>2</sub> (<0.1 ppm) mixing ratios from 3 tower levels at each tower site with a minimum of maintenance. A new instrument occupying one instrument rack was developed to meet these goals (Figure 1). Important features of the new instrument include a data logger control system, a two-stage drying system, modular components for easy replacement and repair, and temperature and pressure controlled CO and CO<sub>2</sub> infrared analyzers. The system is built from commercially available off the shelf parts. The analyzers are the Licor LI7000 for CO<sub>2</sub> and the Thermo Electron 48C for CO. Temperature control of the analyzers and the drying system produces stable measurements eliminating the need for complex algorithms to remove temperature and pressure fluctuations in the sample and calibration data. Preliminary results from measurements in the laboratory and at Kohler Mesa field station in Boulder, Colorado show a target accuracy (measured – assigned) of 0.01ppm ± 0.024 ppm for CO<sub>2</sub>.



**Figure 1:** Four new tall towers measurement systems constructed at ESRL/GMD.